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ANALYSIS OF PHOTON STORAGE CAVITIES FOR A FREE-ELECTRON LASER*

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ABSTRACT

A photon storage cavity, coupled to a free-electron laser (FEL) cavity, has been proposed by Luis Elias as a means to enhance the FEL field level. A general analysis is presented of storage cavities and it is shown that if the coupling between the FEL cavity and the storage cavity is uni-directional (for example, a ring resonator storage cavity) then storage is possible, but that if the coupling is bi-directional then storage is not possible. Parameters are presented for an infra-red FEL storage cavity giving two orders of magnitude increase in the instantaneous photon power.

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